

What is claimed is:

1. A method of providing network access across a shared communications medium in a downstream direction towards competing users, comprising the steps of:
 - (a) monitoring network access usage by each user during a time interval; and
 - (b) based on said monitored network access usage, allocating network access to each user on a per user basis for a future time interval.
2. The method of claim 1, wherein network access comprises bandwidth across the shared communications medium for consumption by each user in conveying data of the user.
3. The method of claim 1, wherein each network access allocation represents a bandwidth allowance of a respective user during the future time interval.
4. The method of claim 3, wherein each network access allocation represents bandwidth utilized by each user during the future time interval.
5. The method of claim 1, wherein said step of monitoring comprises monitoring bandwidth that is consumed by each user in a downstream direction at time intervals of fifteen minutes to sixty minutes.
6. The method of claim 1, wherein the time interval for which network access usage is monitored and the future time interval are equal in length.
7. The method of claim 1, wherein the time interval for which network access usage is monitored and the future time interval each is approximately one minute to sixty minutes in length.
8. The method of claim 1, wherein said step of monitoring network access usage includes collecting data representative of logical data units transmitted to each user during a time interval.

9. The method of claim 1, wherein said step of monitoring network access usage includes collecting data representative of the number of bytes and data packets transmitted to each user during a time interval.
10. The method of claim 1, wherein said step of monitoring network access usage includes collecting data representative of the number of logical data units of the user that are dropped during a time interval.
11. The method of claim 1, wherein said step of monitoring network access usage includes collecting data representative of the number of bytes and data packets of the user that are dropped during a time interval.
12. The method of claim 1, wherein said step of allocating network access comprises allocating network access equally to the users.
13. The method of claim 1, wherein the shared communications medium is part of a Shared Access Carrier Network.
14. The method of claim 13, wherein the Shared Access Carrier Network comprises a Cable Network and the shared communications medium comprises a coaxial cable.
15. The method of claim 13, wherein the Shared Access Carrier Network comprises a wireless network.
16. The method of claim 1, further comprising prioritizing the users for allocating network access.
17. The method of claim 16, wherein said prioritizing is based on fairness considerations.
18. The method of claim 17, wherein the users are prioritized based on user throughput during a time interval, with a user with lesser throughput receiving priority over a user with greater throughput.

19. The method of claim 17, wherein the users are prioritized based on data loss for each user during a time interval, with a user with greater data loss having priority over a user with lesser data loss.
20. The method of claim 17, wherein the users are prioritized based on network access usage for a particular time of day, with a user with lesser network access usage for the particular time of day receiving priority over a user with greater network access usage for the particular time of day.
21. The method of claim 17, wherein the users are prioritized based on both user throughput and data loss of the user during a time interval.
22. The method of claim 17, wherein users are prioritized based on an established minimum quality of service (QoS) standard.
23. The method of claim 16, wherein said step of prioritizing is based on service level agreements (SLAs) of the users regarding the provision of network access.
24. The method of claim 23, wherein SLAs specify respective minimum levels of network access for users, and said step of prioritizing includes comparing said monitored network access usages for the users with the specified respective minimum levels of network access, and awarding priority to a user when said respective monitored network access usage for such user falls below the user's specified respective minimum level of network access.
25. The method of claim 23, wherein SLAs specify respective time-of-day (TOD) minimum levels of network access for users, and said step of prioritizing includes comparing said monitored network access usages for such users during the specified respective TOD with the specified respective TOD minimum levels of network access, and awarding priority to a user when said monitored network

access usage during the specified respective TOD for such user falls below the user's specified respective TOD minimum level of network access.

26. The method of claim 23, wherein SLAs specify respective minimum levels of network access up to a maximum burstable levels with target probability for users, and said step of prioritizing includes comparing said monitored network access usage both with the respective minimum levels of network access for such users and with the respective maximum burstable levels of network access for such users, and comparing the instances the respective maximum levels of network access were obtained for such users out of all instances the respective maximum levels of network access were requested for such users.
27. The method of claim 23, wherein SLAs provide respective fees for network access usage, and said step of prioritizing comprises sorting such users based on each user's respective fee in decreasing order, with a user with a higher fee receiving priority over a user with a lesser fee.
28. The method of claim 23, wherein SLAs provide respective credits for levels of network access below respective guaranteed levels for users, and said step of prioritizing comprises sorting such users based on each user's respective credit in decreasing order, with a user with a higher credit receiving priority over a user with a lower credit.
29. The method of claim 23, wherein SLAs specify respective minimum levels of network access for users, and said step of allocating network access comprises allocating network access to such users equal to each user's specified respective minimum level of network access.

30. The method of claim 1, further comprising the step of forecasting network access usage by each user during the future time interval based on said step of monitoring network access usage by each user.
31. The method of claim 30, wherein said step of forecasting comprises predicting
5 future network access usage of each user based upon monitored past network access usage patterns of each user.
32. The method of claim 30, wherein said step of forecasting comprises applying an adaptive-response-rate single exponential smoothing function and a Holt-Winters' seasonal exponential smoothing function to said monitored network access usages of the users.
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33. The method of claim 30, wherein said step of allocating network access comprises allocating network access to users proportional to each user's forecasted network access usage.
34. The method of claim 30, further comprising the step of prioritizing the users for allocating network access.
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35. The method of claim 34, wherein said prioritizing is based on each user's forecasted network access usage.
36. The method of claim 34, wherein said users are prioritized in increasing order of each user's forecasted network access usage, with a user with a lesser forecasted
20 network access usage receiving priority over a user with a greater forecasted network access usage.
37. The method of claim 34, wherein said step of allocating network access comprises allocating network access to the users equal to each user's forecasted network access usage, and then allocating any remaining network access equally to the
25 users.

38. The method of claim 34, wherein said step of allocating network access comprises allocating network access to the users equal to each user's forecasted network access usage, and then allocating any remaining network access to the users proportionally based on each user's forecasted network access usage.

5 39. A method of providing network access across a shared communications medium between competing users, comprising the steps of:

- (a) monitoring network access usage by each user during a time interval;
- (b) forecasting network access usage by each user during a future time interval based on said monitored network access usage by each user; and
- 10 (c) based on said forecasted network access usage, allocating network access to each user for the future time interval.

40. The method of claim 39, wherein said step of forecasting comprises predicting future network access usage of each user based upon monitored past network access usage patterns of each user.

15 41. The method of claim 39, wherein said step of forecasting comprises applying an adaptive-response-rate single exponential smoothing function and a Holt-Winters' seasonal exponential smoothing function to said monitored network access usages of the users.

20 42. The method of claim 39, wherein said step of allocating network access comprises allocating network access to the users proportionally based on each user's forecasted network access usage.

43. The method of claim 39, further comprising the step of prioritizing the users for allocating network access.

25 44. The method of claim 43, wherein said prioritizing is based on each user's forecasted network access usage.

45. The method of claim 43, wherein said users are prioritized in increasing order of each user's forecasted network access usage, with a user with a lesser forecasted network access usage receiving priority over a user with a greater forecasted network access usage.

5 46. The method of claim 43, wherein said prioritizing is based on fairness considerations.

47. The method of claim 43, wherein the users are prioritized based on user throughput during a time interval, with a user with lesser throughput rate receiving priority over a user with greater throughput rate.

10 48. The method of claim 43, wherein the users are prioritized based on data loss for each user during a time interval, with a user with greater data loss rate having priority over a user with lesser data loss rate.

15 49. The method of claim 43, wherein the users are prioritized based on network access usage for a particular time of day, with a user with lesser network access usage for the particular time of day receiving priority over a user with greater network access usage for the particular time of day.

50. The method of claim 43, wherein the users are prioritized based on both user throughput and data loss of the user during a time interval.

20 51. The method of claim 43, wherein users are prioritized based on an established minimum quality of service (QoS) standard.

52. The method of claim 43, wherein said step of prioritizing is based on service level agreements (SLAs) of the users regarding the provision of network access.

25 53. The method of claim 52, wherein SLAs specify respective minimum levels of network access for users, and said step of prioritizing includes comparing said monitored network access usages for the users with the specified respective

minimum levels of network access, and awarding priority to a user when said respective monitored network access usage for such user falls below the user's specified respective minimum level of network access.

54. The method of claim 52, wherein SLAs specify respective time-of-day (TOD) minimum levels of network access for users, and said step of prioritizing includes comparing said monitored network access usages for such users during the specified respective TOD with the specified respective TOD minimum levels of network access, and awarding priority to a user when said monitored network access usage during the specified respective TOD for such user falls below the user's specified respective TOD minimum level of network access.

55. The method of claim 52, wherein SLAs specify respective minimum levels of network access up to a maximum burstable levels with target probability for users, and said step of prioritizing includes comparing said monitored network access usages both with the respective minimum levels of network access for such users and with the respective maximum burstable levels of network access for such users, and comparing the instances the respective maximum levels of network access were obtained for such users out of all instances the respective maximum levels of network access would have been utilized for such users.

56. The method of claim 52, wherein SLAs provide a respective fee for network access usage by users, and said step of prioritizing comprises sorting such users based on each user's respective fee in decreasing order, with a user with a higher fee receiving priority over a user with a lesser fee.

57. The method of claim 52, wherein SLAs provide respective credits for levels of network access below respective guaranteed levels for users, and said step of prioritizing comprises sorting such users based on each user's respective credit in

decreasing order, with a user with a higher credit receiving priority over a user with a lower credit.

58. The method of claim 52, wherein SLAs specify respective minimum levels of network access for users, and said step of allocating network access comprises allocating network access to such users equal to each user's specified respective minimum level of network access.

59. The method of claim 43, wherein said step of allocating network access comprises allocating network access to the users equal to each user's forecasted network access usage, and then allocating any remaining network access equally to the users.

60. The method of claim 43, wherein said step of allocating network access comprises allocating network access to the users equal to each user's forecasted network access usage, and then allocating any remaining network access to the users proportionally based on each user's forecasted network access usage.

61. The method of claim 39, wherein each network access allocation represents a bandwidth allowance of a respective user during the future time interval.

62. The method of claim 39, wherein each network access allocation represents bandwidth utilized by each user during the future time interval.

63. A method of providing network access across a shared communications medium of a Cable Network between competing users, comprising the steps of:

- (a) monitoring network access usage by each user for a time interval;
- (b) based on said monitoring, forecasting the number of logical data units (LDUs) of each user that will be transmitted over a future time interval;
- and

- (c) based on said forecasting, allocating network access available to each user for the future time interval.

64. A method of providing network access across a shared communications medium of a Cable Network between competing users, comprising the steps of:

- 5 (a) monitoring network access usage requested by each user for a time interval;

- (b) based on said monitoring, forecasting the number of logical data units (LDUs) that will be requested by each user over a future time interval; and

- 10 (c) based on said forecasting, allocating network access available to each user for the future time interval.